

REMARKS

After entry of this amendment, claims 1-7 and 10-40 will be pending. Claims 1-7, 10 and 17-19 have been amended and new claims 20-40 have been added. Claims 8 and 9 have been cancelled. Claim 10 has been amended to correct a typographical error. Claims 5, 7 and 17-19 have been amended to change their dependencies. Other claim amendments will be discussed below.

No new matter has been added through the amended or new claims. Support may be found throughout the specification. In particular, for claim 1, support for 'less than 1 MHz' is found in abstract originally filed in the 10/201,181 application and the amended abstract of the present specification. Support for 'different structures' and 'a low frequency tuning fork resonator and a high frequency tuning fork frequency resonator' may be found in original claims 2 and 8, respectively. Support for claims 20-23 and 27-40 is found in the originally filed application (08/946,921), as acknowledged by the Examiner. Support for claims 24 and 25 may be found at paragraph [0137] of the present specification. For claim 26, support is found at paragraphs [0088] and [0101].

Applicants have amended the abstract. Support for the amendment to the abstract may be found in the abstract originally filed in the 10/201,181 application.

The foregoing amendments are taken in the interest of expediting prosecution and there is no intention of surrendering any range of equivalents to which Applicant would otherwise be entitled in view of the prior art.

By amending the application, the Applicants do not concede that the patent coverage available to them would not extend as far as the original claim. Rather, Applicants reserve the right to file a continuation application to pursue the breadth of the claims as filed. Applicants believe that the Examiner has not made a sufficient showing of inherency of the teachings of the asserted prior art, especially given the lack of teachings in the cited references of the properties that Applicants have recited in their claims.

Further, by the present amendment, it does not follow that the amended claims have become so perfect in their description that no one could devise an equivalent. After amendment, as before, limitations in the ability to describe the present invention in language in the patent claims naturally prevent the Applicants from capturing every nuance of the invention or describing with complete precision the range of its novelty or every possible equivalent. See, Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 62 USPQ2d 1705 (2002). Accordingly, the foregoing amendments are made specifically in the interest of expediting prosecution and there is no intention of surrendering any range of equivalents to which Applicants would otherwise be entitled.

Formal Matters

Applicants have amended the specification to correct the priority claim.

The Examiner objected to the drawings as not showing all the features of the claims. In particular the Examiner cited the SAW devices, membrane oscillators, unimorphs and bimorphs mentioned in claim 4. Applicants respectfully request that this objection be withdrawn in view of the amendments to claim 4. With regard to unimorphs and bimorphs, these are shown in Fig. 4, as discussed at paragraph [0034] of the specification.

The Examiner also objected to the absence of a means to place the resonators in self-oscillating mode, operating in a free decay mode. Applicants respectfully request that this object be withdrawn in view of the amendments to claim 5. Furthermore, Applicants note that previous claim and the present claims do not have a 'means' element. With regard to the measurement circuit, Applicants note that figures 9a and 9b both show measurement circuits. Applicants request that this objection be withdrawn.

The Examiner objected to the specification as containing new matter. Applicants combined the disclosure of U.S. Application No. 08/946,921 filed October 8, 1997 (now U.S. Patent No. 6,182,499; "the '499 patent") with the disclosure of U.S. Application No. 09/133,171, filed on August 12, 1998 (now U.S. Patent No. 6,393,895; "the '895 patent"). Applicants termed the combined application as continuation and not a continuation-in-part (CIP). Applicants respectfully traverse this objection and decline, at this time, to recast the current application as a continuation-in-part.

Initially, the '895 patent was a CIP of the '499 patent and specifically incorporated by reference the disclosure of the '499 patent. The Examiner's attention is drawn to column 1, lines 6-9 of the '895 patent where it states:

The present application is a continuation-in-part of commonly assigned, U.S. application Ser. No. 08/946,921, filed Oct. 8, 1997, now U.S. Pat. No. 6,182,499 is incorporated by reference. (emphasis added).

The present application is connected to the '895 patent by a string of three intervening continuation/divisional applications, each claiming priority to both the '895 and the '499 patents. Each of the three intervening continuation applications also incorporates by reference at least the specification of the '499 patent. A family tree is provided below quoting the incorporation by reference language in each application and patent.

Application	Continuity/ Status	Serial No.	Pertinent Language
Current	CON Pending	10/686,444	<p>"This application is a continuation of 10/266,047, filed on October 7, 2002, which is a continuation of 10/201,181, filed on July 23, 2002, which is a continuation of 09/800,819, filed on March 7, 2001, now U.S. Patent No. 6,494,079, which is a divisional of 09/133,171, filed on August 12, 1998, now U.S. Patent No. 6,393,895, which is a CIP of 08/946,921, filed October 8, 1997, now U.S. Patent No. 6,182,499." (See first paragraph, as amended herein).</p> <p>"The disclosures of all articles and references, including patent applications and publications, are incorporated by reference for all purposes." (See Paragraph [00143] as filed).</p>
Parent	CON Pending	10/266,047	<p>"The present application is a continuation-in-part of commonly assigned, co-pending U.S. Application No. 08/946,921, filed October 8, 1997, the disclosure of which is incorporated by reference." (See first paragraph as filed).</p> <p>"The present application is a continuation of co-pending, commonly assigned U.S. Application No. 10/201,181, filed July 23, 2002, and is a continuation of U.S. Application No. 09/800,819, filed on March 7, 2001, now U.S. Patent No. 6,494,079, which is a divisional of U.S. Application No. 09/133,171, filed on August 12, 1998, now U.S. Patent No. 6,393,895, which is a continuation-in-part of U.S. Application No. 08/946,921, filed October 8, 1997, now U.S. Patent No. 6,182,499, the disclosures of which are incorporated by reference." (See footnote 1).</p>

¹ This application is co-pending and the specification was amended by the applicants to include this statement in the response filed on June 30, 2004.

Grandparent	CON Pending	10/201,181	"The present application is a continuation-in-part of commonly assigned, co-pending U.S. Application No. 08/946,921, filed October 8, 1997, the disclosure of which is incorporated by reference." (See first paragraph as filed. See also footnote 2).
Great-grandparent	DIV Patented 6,494,079	09/800,819	"This application is a divisional of commonly assigned, co-pending U.S. Application No. 09/133,171, filed August 12, 1998, which is a continuation-in-part of commonly assigned, U.S. Application No. 08/946,921, filed October 8, 1997 and issued as U.S. Patent No. 6,182,499 on February 6, 2001, the disclosure of which are incorporated herein by reference." (See footnote 3).
Great-great-grandparent	CIP Patented 6,393,895	09/133,171	"The present application is a continuation-in-part of commonly assigned, U.S. application Ser. No. 08/946,921, filed Oct. 8, 1997, now U.S. Pat. No. 6,182,499 is incorporated by reference." (See Column 1, lines 6-9 of the '895 patent).
Great-great-great-grandparent	ORIG Patented 6,182,499	08/946,921	

As can be seen, there is an unbroken chain of claims of priority to and incorporation by reference of the great-great-great-grandparent application that may be found in each of the members of this family of applications.

Incorporation by reference is a legitimate tool to allow applicants to accomplish several goals. As stated in the MPEP, for example:

Instead of repeating some information contained in another document, an application may attempt to incorporate the content of another document or part thereof by reference to the document in the text of the specification.

² This application is co-pending and applicants plan to amend the specification to include the following statement: This application is a continuation of 09/800,819, filed on March 7, 2001, now U.S. Patent No. 6,494,079, which is a divisional of 09/133,171, filed on August 12, 1998, now U.S. Patent No. 6,393,895, which is a CIP of 08/946,921, filed October 8, 1997, now U.S. Patent No. 6,182,499, the disclosure of which is incorporated by reference.

³ The '079 patent is currently the subject of a request for Certificate of Correction in which the quoted language was inadvertently omitted from the published patent even though the applicant submitted an amendment to the specification in the application transmittal.

The information incorporated is as much a part of the application as filed as if the text was repeated in the application, and should be treated as part of the text of the application as filed. Replacing the identified material incorporated by reference with the actual text is not new matter. MPEP §2163.07(b) (Ed. 8, Rev. 1).

The incorporation by reference practice with respect to applications which issue as U.S. patents provides the public with a patent disclosure which minimizes the public's burden to search for and obtain copies of documents incorporated by reference which may not be readily available. Through the Office's incorporation by reference policy, the Office ensures that reasonably complete disclosures are published as U.S. patents. MPEP §608.01(p) (Ed. 8, Rev. 1).

Contrary to the assertion of the Examiner, it is clear that no subject matter was dropped during the prosecution of this family. While the specification in 09/133,171 application did not include the exact same disclosure as the 08/946,921 application, the 09/133,171 application did incorporate its parent by reference. Any material absence from 09/133,171 but present in 08/946,921 would have been available for inclusion in the specification by means of the 'incorporation by reference' statement. Indeed, applying the above-noted portion of the MPEP, the information incorporated into the 09/133,171 application is as much a part of that application as filed as if the text of the 08/946,921 application was repeated in the application, and *should be treated as part of the text of the application as filed*. Thus, no subject matter was dropped during the prosecution of the 09/133,171 application.

Likewise, the 10/686,444, 10/266,047, 10/201,181, and 09/800,819 applications contain similar 'incorporation by reference' statements of the 08/946,921 application, showing that the applicants have consistently intended that the subject matter in the great-great-great-grandparent application was part of each application. Again, contrary to the assertion of the Examiner, it is clear that no subject matter was dropped during the prosecution of these applications.

Indeed, the 'incorporation by reference' statements show that the applicants did not drop any subject matter. Rather, the 'incorporation by reference' statements evidence the Applicants' retention of the subject matter for later use without further burdening the public with its repetition.

The particular 'incorporation by reference' statement that is important to the analysis of this issue is the one appearing in the 09/133,171 application. Since this application was a CIP of its parent and not a continuation, the 'incorporation by reference' statement was not merely a safeguard against inadvertently omitted subject matter, but also a conscious decision by the Applicants to take advantage of the more general benefits offered by 'incorporation by reference' statements; namely, avoiding the needless repetition of information that is otherwise available to the public. Applicants respectfully

assert that the Examiner's reliance on 'inadvertently dropped' subject matter is misplaced.

Furthermore, case law from the CCPA and Federal Circuit supports Applicants' position in this regard. For example, in the early case *In re Hogan*, 194 USPQ 527, 540 (CCPA 1979)(quoting *In re Schneider*, 179 USPQ 46,50 (CCPA 1973)), the court stated that "[t]here must be continuing disclosure through the chain of applications, without hiatus, to ultimately secure the benefit of the earliest filing date." In the present situation, there is a series of specific 'incorporation by reference' statements that serve to preserve 'the continuing disclosure through the chain of applications, without hiatus'. Since such 'incorporation by reference' statements are explicitly and unambiguously present in each member of this family, the statements are sufficient to maintain the continuity of the disclosure.

Furthermore, 'incorporation by reference' statements are a recognized tool for providing disclosure in a compressed manner. The Examiner's attention is drawn to MPEP 608.01(p), where incorporation by reference is discussed. Applicants assert that 'incorporation by reference' statements maintain the continuity of disclosure and eliminate the possibility of any hiatus in the disclosure of this application.

Applicants respectfully request that this objection be withdrawn.

Rejection of claims 5, 6, 18 and 19 under 35 U.S.C. §112, first paragraph

The Examiner rejected claims 5, 6, 18 and 19 under 35 U.S.C. §112, first paragraph as failing to have adequate written description. This rejection is traversed in view of the present amendments. In particular, the Markush groups of original claims 5 and 6 have been split into three sets of claims, all dependent on claim 1. Amended claims 5 and 6 relate to a sweep generator and variable frequency input signals. New claims 20 and 21 relate to free decay mode and associated measurement circuits. New claims 22 and 23 relate to voltage spikes and pulse generators. These features find adequate support in the specification at paragraphs [0103] (sweep generator); and [0110] (free decay mode and voltage spike). In addition, the members of the Markush group of claim 5 have been incorporated into separate independent claims with an associated dependent claim; namely, claims 27 and 28 relate to sweep generators and variable frequency input signals; claims 32 and 33 relate to free decay mode and associated measurement circuits; and claim 37 relates to voltage spikes and pulse generators.

As discussed above, claims 18 and 19 have been amended to change their dependencies to claim 3. For at least these reasons, the Applicants request that this rejection be withdrawn.

Rejection of claim 3 under 35 U.S.C. §112, second paragraph

The Examiner rejected claim 3 under 35 U.S.C. §112, second paragraph as indefinite. The Applicants have adopted the Examiner's suggestion and amended the claim to include an absence comma. The Applicants request that this rejection be withdrawn.

Rejection of claims 1-4, 9 and 10 under 35 U.S.C. §102(b)

The Examiner rejected claims 1-4 and 10 under 35 U.S.C. §102(b) as anticipated by U.S. Patent No. 4,760,351 to Newell et al. ("Newell"). This rejection is traversed in view of the amendment to claim 1.

The amended claim relates to plurality of resonators that have at least one resonator that operates at less than 1 MHz. Newell disclosed the use of AT-cut quartz crystal resonators that a skilled artisan would understand to be thickness shear mode (TSM) resonators. Newell does not disclose the amended claim feature of an operational frequency of less than 1 MHz. Newell also does not disclose a resonator comprising a plurality of tuning forks. For at least this reason, Applicants request that this rejection be withdrawn.

The Examiner rejected claims 1-4, 9 and 10 under 35 U.S.C. as anticipated by U.S. Patent No. 4,596,697 to Ballato ("Ballato"). This rejection is traversed in view of the amendments to claim 1. Similar to Newell, Ballato discloses a plurality of bulk acoustic wave (BAW) and surface acoustic wave (SAW) resonators as the only constituents of the plurality of resonators. Ballato does not disclose resonators having an operational frequency of less than 1 MHz. Ballato also does not disclose a sensor comprising a plurality of tuning forks.

Rejection of claim 7 under 35 U.S.C. §103(a)

The Examiner rejected claim 7 under 35 U.S.C. §103(a) as obvious over Newell in view of U.S. Patent No. 4,802,370 to EerNisse et al. ("EerNisse"). The rejection is traversed in view of the amended claims and the following remarks.

The requirements of claim 7 have been incorporated into claim 1. However, EerNisse does not make up for the deficiencies with respect to the lack of teaching in Newell. In particular, EerNisse does not teach or suggest the use of at least one resonator that has an operational frequency of less than 1 MHz nor the use of two tuning fork resonators. Hence, the Office action does not set forth a *prima facie* case of obviousness, since the references, even considered in combination, do not disclose all of the required features of previously-pending claim 7 (now claim 1).

Moreover, a skilled artisan would not be motivated to combine the two references. The Examiner states in this regard that a skilled artisan would be motivated to substitute the temperature sensor of Newell with the temperature sensing tuning fork of EerNisse. The Office action does not adequately substantiate the basis for this motivation. In particular, the Office does not explain why a skilled person would have been motivated to substitute a different temperature sensor into the device of Newell. In this regard,

none of the art of record indicates that the temperature sensor used in Newell is deficient in any respect. Additionally, the fact that the references have some common functionality is too general, and would not have led to the particular invention defined by the as-amended claims.

Rejection of claim 8-17 under 35 U.S.C. §103(a)

The Examiner rejected claims 8-17 under 35 U.S.C. §103(a) as obvious over Newell in view of Tanaka and/or in view of Vali. The rejection is traversed in view of the amended claims.

Contrary to the assertion of the Examiner, a skilled artisan would not have been motivated to substitute the TSM resonators of Newell with the tuning fork resonators of Tanaka. The Examiner asserts that motivation may be found in Vali because "Vali et al. teaches the versatility of the tuning fork resonator in being able to determine multiple chemicals with a single sensor and such a substitution would allow for more chemical to be tested for. Whether this is true or not, it is certainly not adequate motivation to substitute the tuning forks of Tanaka for the TSMs of Newell in a manner that would have led to the invention as specifically defined in the presently-pending claims. Hence, the Office action does not set forth a *prima facie* case of obviousness, since a skilled artisan would not be motivated to combine these references.

Motivation to combine the primary reference, Newell, with either or both of the other two references is not found in the prior art of record. That is, absent impermissible hindsight, there is no basis for combining the references in a manner that would have led to Applicant's invention as now claimed.

In particular, Tanaka does not teach or suggest the measurement of physical or chemical properties of a fluid. The failing in this regard can be seen from the following quotations from Tanaka:

This invention relates to a vibrator for use in oscillators, mechanical filters or the like'. (1:15-16).

* * *

Consequently, the unit [including multiple tuning forks] can be used as a frequency analyzer unit, an alarm device, or the like. In the case of the alarm device, a plurality of alarm signal sources placed at different locations are adapted to raise alarm signals of different frequencies, by which detection of an output produced at any of the output terminals 414a, 414b, 414c, ...414n enables location of the source of the alarm signal being raised. (14:14-21).

The discussion of Tanaka is in marked contrast to the present application which expressly requires use of the tuning forks for characterizing a fluid.

Vali does not make up for the deficiencies in Tanaka. In particular, to reduce or eliminate the deleterious effects of temperature, pressure and humidity on the

measurement, Vali discloses that identical resonators can be used with the only difference being the present or absence of a coating:

This magnitude of sensitivity is somewhat difficult to measure due to temperature, pressure and humidity changes that affect the absolute vibrational frequency of the crystal oscillators 21, 23. In accordance with the principles of the present invention, by employing two crystal oscillators 21, 23, and having the first crystal oscillator 21 coated with antibodies 22 and the second crystal oscillator 23 as a reference, Δf may be measured by detecting the beat frequency between the two crystal oscillators 21, 23. (4:16-26).

Similar sentiments are expressed in the invention summary:

Two oscillating crystals are used, one that has been coated with the antibodies, and one that is uncoated. This permits detection of frequency differences between the oscillating frequencies of the two crystals, thus eliminating pressure, temperature, and humidity corrections that conventionally must be made. (1:54-60).

As may be seen from these quotations, Vali does nothing more than disclose the use of two resonators with identical structure, with one being used as a reference.

Since Vali teaches that a reference resonator should be of the same structure as a measuring resonator, a person skilled in the art would not have been motivated to combine Vali with Tanaka in a manner that would have led to the invention defined by claim 1 as amended (requiring different tuning fork structures), since such modification would have made the reference resonator of Vali unsuitable for its intended purpose.

CONCLUSIONS

In view of Applicants' amendments and remarks, the Examiner's rejections are believed to be rendered moot. Accordingly, Applicants submit that the present application is in condition for allowance and requests that the Examiner pass the case to issue at the earliest convenience. Should the Examiner have any question or wish to further discuss this application, Applicant requests that the Examiner contact the undersigned at (248) 292-2920.

If for some reason Applicants have not requested a sufficient extension and/or have not paid a sufficient fee for this response and/or for the extension necessary to prevent the abandonment of this application, please consider this as a request for an extension for the required time period and/or authorization to charge Deposit Account No. 50-0496 for any fee which may be due.

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